

## Abstract

A fast single-article megasonic cleaning system (200) is used to clean substrates (such as semiconductor wafers, flat panel display glass, etc.) at frequencies of 400 kHz - 20,000 kHz or higher. The technique provides a single-wafer cleaning process that reduces the cleaning time from the 10 - 20 minutes typical of the prior art to 15 - 60 seconds. The system utilizes concentrated megasonic energy on one wafer (90) to dramatically reduce cleaning time. The system uses a transducer (210) or a pair of transducers (210a, 210b) parallel to the substrate (90) to be cleaned where the transducer area is more than about 40% of the substrate area. Two alternate configurations are disclosed, one utilizing a horizontal wafer arrangement and the second utilizing a vertical wafer arrangement. The latter requires a smaller floor area. Preferred spacings between the wafer and the transducer, preferred transducer power and intensity, preferred overflow flow rate of fluid medium (220) (which may be deionized water), effective cleaning times, and process temperature are disclosed.